Remarks

The following comments are provided in support of the claims presented.

1. § 112 Rejections

Claims 1-22 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants claim as their invention. Specifically, the Office states with respect to Claims 1 and 14 that "it is unclear as to how the piston claimed is both inside a chamber and outside a chamber"

With regard to Claim 1, this claim recites as element (c): "a piston formed on the substrate and moveable in the plane of the substrate from a first position outside the fluid-ejection chamber to a second position inside the fluid-ejection chamber to eject a jet or drop of the fluid through the orifice." The movement of the piston recited in Claim 1 can be understood with reference to Figs. 1 and 2. In Figs. 1 and 3A, the piston 18 penetrates through an opening in a sidewall 38 of fluid reservoir 16 so that the piston 18 is "at least in part" inside the fluid reservoir 16 while at the same time being outside of the open-ended fluid-ejection chamber 14. In Fig. 3A, which is a cross-section view along the section line 1-1 in Fig. 1, the fluid-ejection chamber 14 extends only for the distance shown by the brackets next to the label "14". This location of the piston 18 outside the fluid-ejection chamber 14 in Figs. 1 and 3A corresponds to the "first position" of the piston 18 as recited in Claim 1.

In the "second position" of the piston 18 as recited in Claim 1, the piston 18, which still extends through the opening in the sidewall 38 and thus is "at least in part" inside the fluid reservoir 16, is moved into the open-ended fluid-ejection chamber 14. This is shown in Fig. 2 and in Fig. 3B which is a cross-section view taken along the section line 2-2 in Fig. 2. In Fig. 3B, movement of the piston 18 from outside the chamber 14 to inside the chamber 14 ejects a jet or drop 110 of a fluid 100 through an orifice 20 formed in the fluid-ejection chamber 14 as shown in Fig. 3B.

With regard to Claim 14, Applicants have herein amended this claim to

change "the actuator" to "a microelectromechanical actuator" to provide a proper antecedent basis.

Claim 14, as amended herein, recites "wherein the piston is located, at least in part, inside the fluid reservoir, and a microelectromechanical actuator is located outside the fluid reservoir." The piston 18 and microelectromechanical actuator 22 or 92 are different elements. Furthermore the fluid reservoir 16 recited in amended Claim 14 is distinct from the fluid-ejection chamber 14. In Figs. 1 and 3A the piston 18 is shown located partly inside the fluid reservoir 16 and partly outside the fluid reservoir 16 since the piston 18 penetrates through an opening in a sidewall 38 of the fluid reservoir 16 (see Fig. 3A and page 14, lines 20-23). This is also shown in Figs. 5-7 where the portion of the piston 18 extending outside the fluid reservoir 16 is labelled as "18." In other embodiments of the present invention, the piston 18 can be located entirely within the fluid reservoir 16 as shown in Fig. 8, with the piston 18 being connected to the microelectromechanical (MEM) actuator 22 through a linkage 48 which can be smaller in width than the piston 18 (see also page 25, lines 2-6). The MEM actuator 22 is also clearly shown in Figs. 1, 2 and 5-9 to be located outside the fluid reservoir 16.

The Office states with regard to Claims 1 and 14, "it is unclear as to how the piston claimed is both inside a chamber and outside a chamber." Applicants urge that the above discussion makes this clear. The piston is moveable between two different positions (i.e. the first position and the second position). This allows the piston 18 to be moved from outside the fluid-ejection chamber 14 as shown in Figs. 1 and 3A to inside the same fluid-ejection chamber 14 as shown in Figs. 2 and 3B. In Claim 14, the fluid reservoir 16 recited is different from the fluid-ejection chamber 14 of Claim 1 although these two elements are in fluidic communication with each other as recited in intervening Claim 10. Thus, the piston 18 can be at least partially inside the fluid reservoir 16 while at the same time being outside the fluid-ejection chamber 14. This is shown in Figs. 1 and 3A. Additionally, the piston 18 can be located at least partially inside the fluid reservoir 16 while the MEM actuator 22 for

operating the piston 18 is located outside the fluid reservoir 16. This, too, is shown in Fig. 1. Applicants respectfully submit that there is no inconsistency between Claim 1 and amended Claim 14 or any indefiniteness in these claims since they recite elements which are clearly shown in the figures and clearly described in the Specification with different reference numbers so that one skilled in the art will understand what Applicants regard as their invention. Reconsideration of the § 112 rejection is respectfully requested.

2. § 102 Rejections

Claims 1-4, 7-11 and 13 have been rejected under 35 U.S.C. 102(b) as being anticipated by Coleman et al (US 6,318,841).

Applicants' Claim 1 recites a piston that is "moveable in the plane of the substrate." Coleman et al does not disclose a piston that is "moveable in the plane of the substrate" as required by Claim 1. Instead, Coleman et al discloses a piston layer 12 that moves in the direction of ejection stroke 30 which is perpendicular to the plane of substrate 22 as shown in Figs. 1-3 and as described in col. 4, lines 58-62; and col. col. 5, lines 21-25 and 36-39. Therefore, since Claim 1 recites the limitation of a piston that is "moveable in the plane of the substrate" which is not disclosed by Coleman et al, then Claims 1-4, 7-11 and 13 cannot be anticipated by Coleman et al.

Furthermore, Coleman et al teach and claim a requirement for "a fluid ejecting electric field" to be "applied between the piston layer and the nozzle plate layer" (see all independent claims - i.e. claims 1, 19, 39; see also col. 2, lines 45-48; col. 3, lines 54-58; col. 4, lines 58-62). No such "fluid ejecting electric field" is present in Applicants' disclosed invention. Applicants' disclosure explicitly states: "the fluid is not exposed to any electric field prior to ejection thereof" (see page 1, line 23 through page 2, line 7; see also page 9, lines 9-12). Therefore, Coleman et al in requiring a "fluid ejecting electric field" which is not present in Applicants' invention cannot anticipate Applicants' claimed invention so that Claims 1-4, 7-11 and 13 are allowable.

3. § 103 Rejections

A. Claims 5 and 6 have been rejected under 35 USC 103(a) as being unpatentable over Coleman et al (US 6,318,841) in view of Delametter et al (US 2004/0036741).

Applicants respectfully submit that the teachings and requirements of Coleman et al are contrary to Applicants' disclosed and claimed invention so that Coleman et al cannot be used in combination with Delametter et al to form a valid *prima facie* case of obviousness for the rejection of Claims 5 and 6. In the device of Coleman et al, the piston layer 12 moves in a direction perpendicular to the plane of the substrate 22 when the piston layer 12 executes an ejection stroke 30 (see Figs. 1-3). This is contrary to Applicants' claimed invention as recited in independent Claim 1 which requires the piston to be "moveable in the plane of the substrate." Additionally, Coleman et al require that "a fluid ejecting electric field" be "applied between the piston layer and the nozzle plate layer" (see claims 1, 19, 39; col. 2, lines 45-48; col. 3, lines 54-58; col. 4, lines 58-62). This, requirement is contrary to Applicants' disclosure which teaches against any exposure of the fluid to any electric field prior to ejection of the fluid (see page 1, line 23 through page 2, line 7; see also page 9, lines 9-12).

Therefore, Applicants respectfully submit that one skilled in the art would not be motivated look to Coleman et al to form Applicants' claimed invention, which requires a piston to be "moveable in the plane of the substrate," since Coleman et al teach to the contrary that the piston layer must be moveable in a direction that is perpendicular to the substrate. Furthermore, one skilled in the art would not be motivated to look to Coleman et al to form Applicants' claimed invention since Coleman et al teach a requirement for a "fluid ejecting electric field" which contacts the fluid; and this is contrary to Applicants' disclosure which teaches that "the fluid is not exposed to any electric field prior to ejection thereof." The contrary teachings in Coleman et al as discussed above provide evidence for the *prima facie* unobviousness of Claims 5 and 6 based on the combination of Coleman et al and Delametter et al so that Claims 5 and 6 are allowable.

Additionally, Claims 5 and 6 recite the essential claim limitation of a thermal actuator. Coleman et al teaches against the use of thermal actuators in col. 1, lines 16-27. Therefore, one skilled in the art would not be motivated to combine Coleman et al, which teaches against thermal actuators, with Delametter et al who disclose the use of thermal actuators in order to form Applicants' invention as recited in Claims 5 and 6 which recites a thermal actuator. The teachings in Coleman et al against thermal actuators provides evidence for the *prima facie* unobviousness of Claims 5 and 6 which recite a thermal actuator. Furthermore, the contrary teachings of Coleman et al and Delametter et al against and for thermal actuators, respectively, would result in a nullity and therefore prevent these two references from being combined to form a valid *prima facie* case of obviousness for the rejection of Claims 5 and 6. Therefore, Claims 5 and 6 are allowable.

B. Claim 11 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Coleman et al (US 6,318,841).

The teachings of Coleman et al with regard to the direction of movement of the piston layer perpendicular to the plane of the substrate are contrary to the requirement of Claim 1 which requires the piston to be "moveable in the plane of the substrate." Additionally, the requirement in Coleman et al for a "fluid ejecting electric field" that is "applied between the piston layer and the nozzle plate layer" (claims 1, 19 and 39) is also contrary to Applicants' disclosure which teaches that "the fluid is not exposed to any electric field prior to ejection thereof" (see page 1, line 23 through page 2, line 7). Therefore, Applicants respectfully submit that one skilled in the art would not be motivated to form Applicants' invention as recited in Claim 11 based on the contrary teachings and requirements in Coleman et al. The contrary teachings and requirements in Coleman et al as described above are evidence for the *prima facie* unobviousness of Claim 11 so that this claim is allowable.

4. § Objections to the Claims

Claims 12 and 15-22 have been objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of

the limitations of the base claim and any intervening claims.

Applicants respectfully submit that there is no need to rewrite Claims 12 and 15-22 in independent form in view of the allowability of base Claim 1 and intervening Claims 10 and 11.

5. Allowable Claims

The Office has indicated in paper no. 20040925 that Claims 23-42 are allowed.

Conclusion

Applicants have responded to each and every rejection and objection, and urge that the Application is in condition for allowance. A favorable reconsideration is earnestly solicited.

Respectfully submitted,

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